



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov



NOTICE OF ALLOWANCE AND FEE(S) DUE

08/22/2008

GREER, BURNS & CRAIN
300 S WACKER DR
25TH FLOOR
CHICAGO, IL 60606

EXAMINER

FISCHER, JUSTIN R

ART UNIT

PAPER NUMBER

1791

DATE MAILED: 08/22/2008

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,209	03/23/2004	Shuichi Tsukada	OGW-0311	1922
TITLE OF INVENTION: PNEUMATIC TIRE AND MANUFACTURING METHOD THEREOF				

APPLN: TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1440	\$300	\$0	\$1740	11/24/2008

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

24978 7590 08/22/2008

GREER, BURNS & CRAIN
300 S WACKER DR
25TH FLOOR
CHICAGO, IL 60606

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,209	03/23/2004	Shuichi Tsukada	OGW-0311	1922

TITLE OF INVENTION: PNEUMATIC TIRE AND MANUFACTURING METHOD THEREOF

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1440	\$300	\$0	\$1740	11/24/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
FISCHER, JUSTIN R	1791	152-539000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.</p>	<p>2. For printing on the patent front page, list</p> <p>(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, _____ 1</p> <p>(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. _____ 2</p> <p>_____ 3</p>
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE _____ (B) RESIDENCE: (CITY and STATE OR COUNTRY) _____

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
---	--

5. Change in Entity Status (from status indicated above)

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,209	03/23/2004	Shuichi Tsukada	OGW-0311	1922
24978	7590	08/22/2008	EXAMINER	
GREER, BURNS & CRAIN 300 S WACKER DR 25TH FLOOR CHICAGO, IL 60606			FISCHER, JUSTIN R	
			ART UNIT	PAPER NUMBER
			1791	
DATE MAILED: 08/22/2008				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 783 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 783 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability	Application No.	Applicant(s)	
	10/806,209	TSUKADA ET AL.	
	Examiner	Art Unit	
	Justin R. Fischer	1791	

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address–

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 24 July 2008.
2. ☒ The allowed claim(s) is/are 4, 6, and 7 (renumbered 1-3).
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ 7. <input type="checkbox"/> Examiner's Amendment/Comment 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other _____ |
|--|--|

DETAILED ACTION

Allowable Subject Matter

1. Claims 4, 6, and 7 (renumbered 1-3) are allowed. The statement of reasons for allowance has been set forth in the decision rendered by the Board of Patent Appeals and Interferences rendered on June 30, 2008.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Justin R. Fischer** whose telephone number is **(571) 272-1215**. The examiner can normally be reached on M-F (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Justin Fischer
/Justin R Fischer/
Primary Examiner, Art Unit 1791
August 6, 2008

Notice of References Cited	Application/Control No. 10/806,209	Applicant(s)/Patent Under Reexamination TSUKADA ET AL	
	Examiner Justin R. Fischer	Art Unit 1733	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Machine Translation of JP 2001-113902. (published in 2001)
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to amelioration of the wheel structure of a car.

[0002]

[Description of the Prior Art] If drawing 10 shows the schematic diagram of the wheel currently used from the former and explains it with reference to this drawing 10, it is known that the air column resonance in the closed space 5 formed with a tire 1 and a wheel 10 during car transit is the cause of worsening a load noise from the former. In detail, an air column resonance is a resonance which a random vibration inputted into a tire 1 from a road surface vibrates the air in a closed space 5, consequently a resonance phenomenon happens near the air column resonance frequency of a closed space 5, and is generated.

[0003] Although this air column resonance frequency is generally decided on the basis of the formula shown with the die length from $f=c/2\pi r$ however f :air column resonance frequency, c :acoustic velocity, and r :wheel center to the direction center section 20 of a path of a closed space, when the tire ground plane 17 deforms by car weight, the peak of an air column resonance frequency is divided into plurality in fact. Anyway, the cross-section configuration of a closed space 5 is not based on rotation of a wheel 12, but by the conventional wheel structure, it becomes constant value, and r of the above-mentioned formula always resonates on the same air column resonance frequency, and becomes a jarring sound with high sound pressure level from an always fixed thing.

[0004]

[Problem(s) to be Solved by the Invention] By the way, by having the approximately cylindrical ring which contained in JP,9-11704,A the layer which changes from at least one viscoelasticity ingredient to the peripheral face of a tire wheel as a means to solve the noise from a wheel, the mechanical oscillation of a wheel is absorbed and the technique of reducing the noise of a wheel is indicated. However, since this technique was not what controls generating of columnar resonance fundamentally, it had the technical problem that sufficient noise-reduction effectiveness was not acquired.

[0005] It was originated in view of the above-mentioned technical problem, and this invention aims at offering the wheel structure of a car which enabled it to reduce effectively the noise generated according to the columnar resonance in the closed space of a wheel.

[0006]

[Means for Solving the Problem] For this reason, the time amount which resonates with a single resonance frequency is shortened, and it enables it to reduce the noise accompanying an air column resonance by changing the cross-section configuration of a closed space in a hoop direction in the wheel structure of the car of this invention, so that it may change with rotation of the wheel which the air column resonance frequency of the closed space which is surrounded by a wheel and the tire and is formed becomes from a wheel and a tire.

[0007]

[Embodiment of the Invention] Hereafter, with a drawing, when the gestalt of operation of this invention

is explained, drawing 1 - drawing 5 show the wheel structure of the car as the 1st operation gestalt of this invention. Drawing 6 shows the wheel structure of the car as the 2nd operation gestalt of this invention, drawing 7 shows the wheel structure of the car as the 3rd operation gestalt of this invention, drawing 8 shows the wheel structure of the car as the 4th operation gestalt of this invention, and drawing 9 shows the wheel structure of the car as other operation gestalten of this invention. It explains based on these drawings. However, in drawing 1 - drawing 9, the same component as the above-mentioned conventional example gives the same sign.

[0008] When the wheel structure of the car of the 1st operation gestalt of this invention is explained, as shown in drawing 1, first, to the peripheral face 3 of the rim section 6 of the wheel 10 of a car. The cross-section configuration of the closed space 5 which is surrounded by the tire 1 of the perimeter from which the radii-like bulkhead 15 constitutes a wheel 12 as side view is arranged at four regular intervals and shows drawing 2 and drawing 3 by having one eighth of the length about, and the wheel 10, and is formed in them is changed in the hoop direction.

[0009] Since the wheel structure of the car of the 1st operation gestalt of this invention is constituted as mentioned above, as are shown in drawing 2, and it rotates abbreviation $1/8$ from the condition A that there is no bulkhead 15 in rim section 6 peripheral face 3 which counters the tire ground plane 17, and its condition and is shown in drawing 2, air column resonance frequencies differ in the condition B that a bulkhead 15 is in the above-mentioned part. In addition, in drawing 2 and drawing 3, the sign 20 shows the direction center section of a path of a closed space 5.

[0010] When grounding directly under the part where the bulkhead 15 is arranged in detail (condition B) The distance HB between the tire inner skin 8 in the tire ground plane 17 and the peripheral face 3 (field 27 of a bulkhead 15) of the wheel 10 which counters this tire inner skin 8 Since it becomes short by the height of a bulkhead 15 compared with this distance HA in the case (condition A) of grounding directly under a part without a bulkhead 15, the direction center section 20 of a path of a closed space 5 displaces to a wheel 12 periphery side.

[0011] For this reason, in Condition A and the Condition B, the touch-down section cross-section height of a closed space 5 will differ, and the locations of the direction center section 20 of a path in the touch-down section of a closed space 5 will also differ. As mentioned above, since an air column resonance frequency is decided by die-length r from a wheel center to the direction center section 20 of a path, air column resonance frequencies differ in each condition. And with rotation of a wheel 12, as shown in drawing 4, it comes to change continuously between the air column resonance frequency a and a' (refer to an example and the continuous line to attach) in Condition A and the air column resonance frequency b in Condition B, and b' (refer to an example and the broken line to attach).

[0012] Consequently, that (refer to the conventional example and the dashed line to attach) which resonates on the always same frequency even if the air column resonance frequency in a closed space 5 is not based on rotation of a wheel 12 but a wheel 12 rotates in the conventional, always fixed wheel structure is received. Since an air column resonance frequency is changed by making abbreviation $1/4$ rotation of a wheel 12 into a round term according to the wheel structure of this operation gestalt, the time amount which resonates on a single frequency becomes short, and as a continuous line and a broken line show to drawing 4, the noise level accompanying an air column resonance frequency becomes low. The noise can be made hard for sound pressure level to become low and to sense for crew, since an air column resonance frequency is moreover divided into a large number.

[0013] Furthermore, if the noise level of an air column resonance falls, since the amplitude of the air column resonance frequency domain transmitted to a wheel 10 will also fall, the noise accompanying resonance of the wheel 10 resulting from an air column resonance can also be reduced. On moreover, a frequency higher than the bell mode in which the car cross-direction both ends of a wheel 10 displace and resonate to hard flow by the cross direction focusing on a spindle on a wheel 10, respectively, and bell mode Although there is a resonant frequency in the two modes with the bending mode in which the above-mentioned part displaces and resonates in this direction by the cross direction focusing on a spindle, respectively When said two natural frequencies exist in the frequency domain near [where the amplitude is still large] an air column resonance frequency rather than other frequencies among the

frequencies inputted into a wheel 10, there is **** resonance of a wheel 10 amplifies and it becomes impossible to reduce noise level effectively.

[0014] However, the natural frequency in the bending mode mentioned above is proportional to the flexural rigidity of a wheel 10, since the natural frequency in bell mode is in inverse proportion to the weight of a wheel 10, if the above-mentioned bulkhead 15 is formed in the peripheral face 3 of a wheel 10, the natural frequency in bending mode will go up with the improvement in flexural rigidity of a wheel 10, and the natural frequency in bell mode will fall with the increment in weight. Therefore, since both natural frequencies can be removed from an air column resonance frequency domain by adjusting the board thickness of a bulkhead 15, the quality of the material, weight, etc. even if the natural frequency of a wheel 10 is in an air column resonance frequency domain as a continuous line shows to drawing 5, magnification (refer to the dashed line of drawing 5) of resonance of the wheel 10 which was easy to produce conventionally can also be prevented.

[0015] Next, explanation of the wheel structure of the car as the 2nd operation gestalt of this invention loops the peripheral face 3 of the rim section 6 of a wheel 10 around the band 30 in this wheel structure, as shown in drawing 6. It has the shape of toothing which continued by side view, twists around the peripheral face 3 of the rim section 6 of a wheel 10, and is fixed by combining the attachment section 28 of both ends mutually, and this band 30 is changing the cross-section configuration of a closed space 5 to the hoop direction with this band 30 while equipping those both ends with the attachment section 28. Since it is constituted as mentioned above, it not only can acquire the above-mentioned operation gestalt and the same noise-reduction effectiveness as abbreviation, but the wheel structure of the car as the 2nd operation gestalt of this invention has the advantage whose posterior matter injury is attained while being able to simplify a production process.

[0016] Next, explanation of the wheel structure of the car as the 3rd operation gestalt of this invention makes the configuration of rim section 6 peripheral face 3 of a wheel 10 itself configurations other than a perfect circle in this wheel structure, as shown in drawing 7. Since the wheel structure of the car as the 3rd operation gestalt of this invention is constituted in this way and is changing the cross-section configuration of a closed space 5 to the hoop direction, it can acquire each above-mentioned operation gestalt and the same noise-reduction effectiveness as abbreviation.

[0017] Furthermore, if the wheel structure of the car as the 4th operation gestalt of this invention is explained, as shown in drawing 8, by this wheel structure, bulkhead 15' will be partially prepared in the tire inner skin 8, and the cross-section configuration of a closed space 5 will be changed in the hoop direction. Since the wheel structure of the car as the 4th operation gestalt of this invention is constituted in this way and is changing the cross-section configuration of a closed space 5 to the hoop direction, it can acquire each above-mentioned operation gestalt and the same noise-reduction effectiveness as abbreviation.

[0018] Although the noise was furthermore reduced with the above-mentioned operation gestalt according to the operation which changes the air column resonance frequency in a closed space 5 with rotation of a wheel 12 by making it change from a wheel center to rotation of a wheel 12 with die-length r (the die length of direction Chuo Line of a path of a closed space 5) to the direction center section 20 of a path of a closed space 5 Even if it changed the cross-section configuration of a closed space 5 by research of the developers concerning this invention so that the cross section of a closed space 5 might be changed by rotation of a wheel 12, it became clear that the air column resonance frequency in a closed space 5 can be changed by rotation of a wheel 12.

[0019] If bulkhead 15" is prepared in the cross direction side face of a tire inside as shown in drawing 9 (a) and (b), there In the condition that bulkhead 15" is in the part equivalent to the tire ground plane 17 in a closed space 5, and the condition that there is no bulkhead 15" in said part Since the cross sections of said part differ, an air column resonance frequency can be changed by rotation of a wheel 12 like the above-mentioned operation gestalt, and the noise can be reduced.

[0020] In addition, with this operation gestalt, although a bulkhead 15, 15', and 15" were considered as four or the configuration arranged two, if it is the configuration which arranges the bulkhead which has the die length of the abbreviation 1/4 of perimeter length in a tire inside or rim section 6 peripheral face

3 of a wheel 10 to 2 regular intervals, the time amount which resonates on a single air column resonance frequency can be shortened most, and the noise can be reduced most.

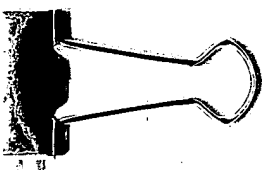
[0021] Moreover, in 2.5% or more (2.5% or more of or abbreviation), then an air column resonance frequency, the cross-sectional area of a bulkhead 15 can be effectively shifted to the cross-sectional area of a part without a bulkhead [in / for the direction of path shortest section die length of a closed space 5 / 97% or less (97% or less of or abbreviation) or the closed space 5 of the longest section die length] except tire ground-plane 17, and much more noise-reduction effectiveness is acquired.

[0022]

[Effect of the Invention] As explained in full detail above, according to the wheel structure of the car of this invention, the time amount which resonates on a single air column resonance frequency can be shortened, and there is an advantage to which the noise level accompanying an air column resonance can be reduced.

[Translation done.]

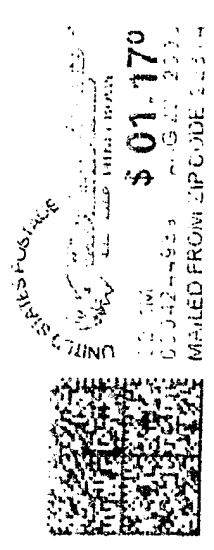
10/17/00



P.O. Box 1450
Alexandria, VA 22313-1450
If Undeliverable Return in Ten Days

AN EQUAL OPPORTUNITY EMPLOYER

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300



RECEIVED
SEP 02 2008
USPTO MAIL CENTER